

**Notice of Allowability**

Application No.

10/707,611

Examiner

Hal I. Kaplan

Applicant(s)

PETTIGREW, DANA ROBERT

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant's amendments filed 9/1/06.
2. ☒ The allowed claim(s) is/are 1-30.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application  |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>20061017</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment  |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|  | 9. <input type="checkbox"/> Other _____  |

### **DETAILED ACTION**

The Examiner wishes to thank the Applicant for the time and courtesies extended in the telephone interview on July 14, 2006.

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with John Elnitski on October 17, 2006.

The application has been amended as follows:

#### **Amendments to the Specification:**

**Please replace the paragraph 11 with the following amended paragraph.**

The present invention is a variable frequency power system to drive a three phase electrical motor at the frequency, voltage and amperage, as required by the motor operation to drive a driven unit. The variable frequency power system of the present invention ~~can be especially applied~~ is especially applicable where the driven unit is an electric submersible pump used in the oil and gas industry. The electric submersible pump is driven by an alternating current (AC) three phase electrical motor which exhibits a non-linear relationship between rotational speed and torque load due to the inherent characteristics of centrifugal pumping systems. The variable frequency power system includes a generator driven by a power source. The variable frequency

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power system includes a specially programmed logic circuit in a system controller, which interfaces with the power source of the generator. The programmed logic circuit is designed to monitor and control the driven unit by monitoring the conditions of the driven unit and controlling the supplied power to the motor. The system controller would be responsible for adjusting and monitoring the generator output, and would adjust the generator to any voltage and frequency required by the driven unit within the effective operational limits of the generator. Not only can this equipment allow for desired steady-state operational parameters, it can be set up to allow for completely different parameters during start-up of high power draw electrical devices, such as electric motors, or to react to monitored inputs of the driven unit. The system controller of the variable frequency power system controls the generator speed[[.]] and output voltage, and is capable of accepting inputs from external sources to control the operation of the entire system. In the case of electric submersible pumps, current draw and pump operating pressures can be monitored and generator frequency and voltage can be automatically adjusted due to changes in those readings, including emergency shutdown of the pump, if needed. The variable frequency power system can also include a human-machine interface. The human-machine interface can include a display screen and input buttons to allow an operator the ability to select desired operational and startup routines, monitor operating system parameters, or [[to]] modify operational parameters as needed without requiring in-depth knowledge of the underlying hardware and code of the system controller.

**Please replace the paragraph 15 with the following amended paragraph.**

The engine rotates the three phase electrical generator designed for variable frequency operation. The generator is electrically coupled to the three phase motor. The throttle device is usually a combination of a throttle and electronic speed controller to control the speed of the engine, and thus control the turning frequency of the engine. ~~Whereby, a~~ An increase or decrease in engine speed would in turn increase or decrease the frequency of generated three phase power being supplied to the three phase motor by the generator. The excitation controller is a voltage regulator capable of varying its voltage output in a programmable manner to the engine speed driving the generator. The system controller interfaces with the throttle device and the excitation controller to monitor, control and regulate the desired operating parameters of the electric motor. The system controller adjusts the speed based on monitored readings and the desired operating conditions of the motor for any one particular drive unit application. The monitored readings can be from sensors at the motor or in the case of an electric submersible pump, at the pump itself. The uninterruptible power supply keeps the monitoring, control and adjustment functions operating during large changes in the frequency of the electrical power being generated to power the motor.

**Amendments to the Claims:**

20. (currently amended) The method of claim 13, further including

using the system controller to control a startup sequence of the power source and generator combination by running the power source at idle with no load from the motor for a specified warm-up period[.];

once warm-up is achieved, increasing the rotational speed of the rotating output of the power source to a steady operating frequency slightly below full operating frequency, ~~the power source~~ while regulating output voltage from the generator at a reduced output voltage using the voltage regulator[.];

using the system controller to engage the power from the generator to the motor while holding the output voltage fixed at the reduced voltage regardless of change in rotational speed of the power source[.];

after a given period of time elapses, using the system controller to command the voltage regulator to ramp up the output voltage of the generator to achieve the required voltage to frequency ratio required by the motor[.]; and

finally waiting until the system reaches steady operation before bringing the power source to the final operational speed.

24. (currently amended) The method of claim 13, further including

using the system controller to control a startup sequence where normal operating range of the motor will be in a range of forty to sixty Hertz and a set point of the desired

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operational frequency of the outputted power is selected in the system controller[[],];  
and

using the system controller to return the power source to an idle speed after initial warm up and then setting the rotational speed of the power source at a higher set speed level, so that the power source gains speed and gets up to a speed of about thirty Hertz, before power is transferred from the generator to the motor.

26. (currently amended) The method of claim 13, further including

using the system controller to control a startup sequence of the power source and generator combination, where the normal operating range of the motor will be in a range of fifty to sixty Hertz range and a set point of the desired operational frequency of the outputted power is selected in the system controller[[],];

using the system controller to set the rotational speed of the power source such that the rotational speed is sufficient to prevent stalling of the power source while the power source picks up motor load when the power is transferred from the generator to the motor; and

allowing the power source to recover and return to the desired operational frequency setting selected for the power to be generated to the motor.

2. The following is an examiner's statement of reasons for allowance:

Claims 1-30 are allowed because, as agreed in the telephone interview on July 14, 2006, and noted by Applicant, none of the prior art of record discloses or suggests to use a speed control with a system controller to produce a desired operational output

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frequency from a generator to meet operational conditions of electrical motor load, in combination with the remaining claimed features.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

3. Applicant's arguments, see Remarks, filed September 1, 2006, with respect to the objections and rejections have been fully considered and are persuasive. The objections and rejections have been withdrawn.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hal I. Kaplan whose telephone number is 571-272-8587. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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